

CHOLERA AND THE FIGHT FOR PUBLIC HEALTH REFORM IN MID-VICTORIAN ENGLAND

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Of the many social changes that occurred during the Victorian age, public health reform is widely agreed to be one of the most significant. In the early Victorian era the vast majority of Britons drank water from murky ponds and rivers, carried to their dwellings in buckets; and their excrement was deposited into the streets and paths outside their houses. By the end of the century however, piped water from wells or lakes was widespread in all but the most rural areas, as was the disposal of urine and faeces by comprehensive systems of sewage pipes.

The success of these reforms was reflected in the pattern of infectious diseases which affected the population of Britain. Typhus, typhoid, cholera, gastro-enteritis, smallpox and tuberculosis all caused huge mortality in the early decades of the nineteenth century; but by the 1890s the mortality had fallen dramatically. In particular cholera had disappeared, and typhus and typhoid were almost gone. As well as these medical improvements, the associated engineering achievement was considerable; there are few households in the United Kingdom whose dwellings are not to this day serviced by water pipes and sewers built in the mid-Victorian period.

Of all the infective diseases feared by the Victorians, cholera was without doubt the greatest. It was a dramatic dehydrating diarrhoeal illness which spread around the country (and indeed the western world) in major epidemics. Though its effect on overall death rates was not great, many historians believe that its sudden epidemic nature made the disease a major instigator of public health reform.¹

Though the cause of cholera, and its mode of transmission remained unknown for much of the nineteenth century its association with filth and squalor were well known (the 'Court for King Cholera' see illustration on page 11). In 1849, *The Times* published a letter from a group of fifty-six poor people from a deprived area of London, describing their plight. To the credit of the newspaper, they printed the letter exactly as it was written, and the following is an abstract:

'We live in muck and filth... we got no priviz, no dust bins, no drains, no water splies, and no drain or suer in

the hole place...we all of us suffer, and numbes are ill, and if the cholera comes, Lord help us'.²

Fear and public concern about this disease, particularly in the 1849 epidemic, was to have a major effect on health reform in mid and late Victorian England. This article will trace the political and social influences on public health reform during this period and will critically examine the role played by the great cholera epidemics of 1832, 1849, 1855 and 1866 in securing a sanitary system and policy which, though by no means faultless, was securely in place by the end of the century.

The Early Nineteenth Century Sanitary Perspective.

The early nineteenth century was a time of deplorable urban living conditions and standards of public health. This was related to population growth, urbanisation, and industrialisation of towns and cities, out of step with housing provision. Epidemics of cholera, typhus, dysentery and smallpox occurred - diseases now confined to the tropics and widely regarded as 'exotic'. England's state in the early and mid-1800s was what would now be called 'Third World'. Between 1821 and 1831 for example the population of Manchester increased by fifty per cent, and in 1840 the average age at death for Manchester workers was an incredible seventeen years - though this was heavily affected by a massive infant mortality rate.³ Inner-city overcrowding was intense, sewage systems were essentially non-existent and the population frequently outstripped the water (and even food) supply. Asa Briggs has described the nineteenth century city as 'sick', and the 'victim of serious degeneration', contrasting markedly with the 'harmonious' cities of the Middle Ages.⁴ Even in the late 1890s an outbreak of smallpox occurred in Middlesbrough with 200 fatalities.

Insanitary conditions were a dominant theme amongst early Victorian critics of city life. James Kay in 1832 described poverty, disease and malnutrition in Manchester; and in particular the canal-side tenements ridden with cholera.⁵ *The Condition of the Working Class in*

England recorded Frederick Engel's experiences of industrial Manchester between 1842-1844. Engels was a German manufacturer on a relatively brief sojourn in England, and his book is an odd mixture of personal observation and information recorded secondarily from newspapers and parliamentary papers. Nevertheless, his first-hand accounts are arresting, particularly of families dwelling in damp and foul cellars ('foul pools of stagnant urine and excrement'), sewage running into canals, communities blackened by chimney smoke, and starving masses searching for food in rubbish heaps. Early Victorian novelists made similar observations. Elizabeth Gaskell published *Mary Barton* in 1848. She had lived in Manchester since 1842 and though upper middle class herself, her life as a vicar's wife led her to visit the poor and sick of industrial Manchester. Gaskell describes a cellar dwelling - 'the smell was so fetid as to almost knock the two men down', there were 'three or four little children rolling on the damp... brick floor, through which the stagnant, filthy moisture of the street oozed up'. Also in the cellar was the children's father, Mr Davenport, ill with typhus from which he eventually died. Another novel reflecting the period is Charles Dickens's *Hard Times*, based on a visit Dickens made to the cotton lock-out in Preston in 1854. The 'monstrous serpents of smoke' of Coketown are vividly recorded, as is the 'black canal... and a river that ran purple with ill-smelling dye', and also the extreme rich-poor divide (the affluent Gradgrind and the destitute Stephen Blackpool).

Widespread knowledge of insanitary urban conditions eventually led to parliamentary questions, and finally official enquiries. These showed for example that in the 1840s, ten to twenty per cent of Liverpool's population were cellar-dwellers. Death rates in these conditions were over 30/1,000 per year, rising to 70/1,000 per year by the late 1840s. Indeed, in 1847 Liverpool's mortality rate was unenviably the worst in England and possibly at the time in the world. Migration from the Irish famine had greatly added to Liverpool's problems, but all large towns in early and mid-Victorian England were terribly vulnerable to major disease epidemics; which on a background of poor nutrition and ineffective health provision, resulted in high mortality. Hume has pointed out that though some association was accepted between overcrowding, filth and disease; public health was not on the agenda when towns were planned and built. The growing sprawl of crowded and undrained buildings was to prove a major legacy of neglect, when public health reform eventually began.⁶

Edwin Chadwick and the Sanitary Movement.

Perhaps the single most influential person in the movement for health and sanitary reform, which culminated in the successful tabling and passing of the 1848 Public Health Act, was Sir Edwin Chadwick (1800-1890). Chadwick was

'A Court for King Cholera'. A cartoon demonstrating the conditions of filth well known to predispose to cholera.
From *Punch*, 25th September 1852

a civil servant of considerable energy and charisma. He was a large man with a commanding presence, who 'attracted opposition which boiled up into hostility'. He hated disease and poverty, and saw it as a reflection of ineffective central, and particularly local, government. His energies were indeed prodigious. He was a Royal Commissioner on the Poor Law Enquiry of 1833, wrote the report which led to the 1834 Poor Law Act, and became subsequently First Secretary under the Act. He was also a Royal Commissioner on the Child Labour in Factories Enquiry (1836) and the Constabulary Commission of 1839. He published reports on Internment (1843) and the Health of Towns (1844 and 1845); and he spoke and wrote widely on various topics including sewage, agricultural drainage, education, poverty, and even cures for sea sickness and the production of bread!

Chadwick's major contribution to the public health debate (and indeed, to some extent he was the initiator of the debate), was his *Report on the Sanitary Conditions of the Labouring Population*. He began work on this in 1830, and it was eventually published in 1842. Chadwick's thesis was that the appalling urban morbidity and mortality of the poor required an organisational solution. He was intensely critical of local administration, and doctors also came in for sharp criticism for failing to consider preventative approaches to disease. Chadwick made effective use of figures to argue his case, drawing on reports of the London Statistical Society. He showed that the horrific mortality rates in England were actually worse than at the beginning of the nineteenth century (ie pre-industrialisation and urbanisation), and that the current problem was essentially one of towns. For example, London's 218 acres of burial grounds were, at the time Chadwick was preparing his report, burying 20,000 adults and 30,000 children annually.

Chadwick's success owed much to attention to detail. Where sewers existed, they were essentially drains for rainwater. The medical profession was slow to accept evidence for the water-borne spread of diseases such as

cholera and typhus. On this background, Chadwick insisted on the importance of sewage pipes connecting houses to drains, and even that they should be of relatively narrow-bore glazed brickwork, flushed regularly with water. The 'privies' and the 'night soil' had to go, and water supply had to be made adequate to flush away the waste. Finally, Chadwick also pointed out the pollution danger from dead bodies. The huge number of deaths were outstripping space in public graveyards, and the dead were frequently buried ten or twelve deep. Old bodies were often dug up to make way for new.

Unhappily, private interests, and even blatant corruption retarded reform. Water companies were in close competition, and the cheap option was often simply to pipe water from the heavily polluted Tyne, Thames or Mersey. Water was also an expensive commodity. Most of the population (including rate payers) had to queue at public wells, and even when water was piped the amounts were severely limited – sometimes amounting to less than a gallon per person per day. Many towns had several authorities in charge of drainage, with no co-operation or combined plans.

In the end, it was the fearful cholera epidemics which swayed political and public opinion in Chadwick's direction. Though the exact transmission of cholera and other enteric fevers remained in dispute, general agreement evolved through the 1830s and 1840s that filth and sewage were a common factor. There were two major theories of transmission at the time. The 'contagionist' theory proposed, as the name suggests, that cholera was passed by contact. It was an unpopular idea as it implied the need for quarantine and separation, which in turn stopped trade and commerce, and exacerbated poverty. The opposing 'miasmatic' theory held that disease was spread by the miasmas of filth impregnating the atmosphere. This led to the frequent practice of lighting fires in the streets to cleanse the atmosphere.⁷ Chadwick in fact, supported the wrong theory – he was a convinced miasmatic, believing that toxic vapours from excrement caused disease, rather than direct water-borne transmission of an infective organism. The debate was to continue throughout the century, but fortunately the fact that Chadwick backed the wrong horse did not matter – sanitation was the key to either theory. Chadwick himself in his 1842 report records a report of Robert Baker of Leeds on the cholera epidemic there in 1832:

'By the inspection of a map of Leeds, which Mr Baker has prepared at my request, to show the localities of epidemic diseases, it will be perceived that they similarly fall on the uncleansed and close streets occupied by the labouring classes, and that the track of cholera is nearly identical with the track of fever. It will also be observed that in the badly cleansed and badly drained roads to the right of the map, the proportional mortality is nearly double that which prevails in the better conditioned districts to the left'.⁸

Sadly, Baker's astute observations had gone unnoticed and unheeded since 1832, and were not to be brought to bear with anything like adequate effectiveness (in terms of sewage disposal) until after the 1848-49 cholera epidemic. Even the prestigious Royal College of Physicians of London contributed little to the debate. In 1854, their 'Cholera Committee' commented that 'the theory that the cause of

the disease is a general state of the atmosphere... has been found untenable'. Moreover, 'no sufficient reasons have been found for adopting the theory that the poison is swallowed with the food or drink'.⁹

The Public Health Act of 1848.

Three public health bills actually came before parliament in 1840, though Chadwick considered them insufficiently far reaching. They failed to gain sufficient parliamentary support anyway. A more realistic Public Health Bill was defeated in 1847, and finally the definitive Public Health Act was passed in 1848. The main principles were that drains should be small-bore, glazed and water-flushed; single bodies should administer drainage areas; improvements should be comprehensive (including sewerage, paving, water supply, and cleansing); and finally that financing should be by loans repayable over prolonged periods.

Supervision of the Act was more difficult, and agreement took some time. Eventually, a Central Board of Health was set up in London (with Chadwick not surprisingly playing a leading role!); and local administration was left for local councils to elect Local Boards of Health. The Public Health Act and the formation of its administrative machinery did not proceed unchallenged, but in the end, the bill was passed probably because of public pressure and a feeling that 'something must be done' – particularly as a further epidemic of Asiatic cholera was predicted, and action seemed mandatory. The predictions were in the event highly accurate, and within a year of its successful passage, the new Act was put to the test by the cholera epidemic of 1848-49. The operation of the Public Health Act was indeed complex. The actual recommendations were sound and sensible. Some have been mentioned above; others included directives that drainage pipes were to connect to sewers, or if there was not one near, to a cesspool. Building of cellars for living in was banned, and existing ones were to be improved and drained. Cemeteries and slaughterhouses were to be closely controlled. Unfortunately however, whether such improvements were carried out in a particular town was entirely dependent upon local initiative. Henriques has described the bill an 'enabling Act, with few teeth'.¹⁰ Its execution was dependent on the formation of Local Boards, which could only be set up following a petition of at least ten per cent of local ratepayers, or if the annual death rate exceeded 23/1,000 per year. This latter criterion, difficult to measure anyway, was often ignored. Following petition, there was a visit by an inspector from the General Board, a public enquiry, and finally a report from the inspector to the General Board.

If a Local Board was approved, then prescribed officers were appointed – a clerk, a treasurer, a surveyor, an Inspector of Nuisances, and (optionally) a Medical Officer. Rates could be levied, and with the consent of the General Board, loans raised. Thereafter however, the General Board had no power to force the Local Board to carry out work as required, and there was no provision for re-inspection. Not surprisingly, progress was slow. By 1853, five years after the Act was instituted, 284 towns had petitioned the General Board, of which 182 had Local Board approval. Of these towns, seventy had planned their new work, but only thirty-one had the work approved by the Local Board, and in only thirteen towns were these new sewers completed.

Essentially, the Act was indeed permissive, and not mandatory, though other measures made up for some inadequacies of the Act. London had been amazingly omitted (despite being arguably the most disease-ridden of England's cities), but was covered partially by the separate City of London Sewers Act. Lodging Houses were brought into the new system in 1851. Even prior to 1848, minor town improvement bills in 1846 and 1847 helped a little, as did a Nuisances Removal Act in 1846. The Public Health Act of 1848 should thus be seen as the main measure of several which encouraged towns to adopt a cleaner approach to urban living. The Public Health Movement applied pressure for towns to adopt a Local Health Board; or to 'go it alone' with local improvements, or even to petition parliament for their own Improvement Act. Liverpool is a good example of the occasional town which took its own initiative. The 1846 Liverpool Sanitary Act pre-empted the Public Health Act by two years, and established the first ever Medical Officer of Health - Dr W.H. Duncan. The initiative was a mixture of enlightened thinking and necessity - the massive influx associated with the Irish famine, and the subsequent overcrowding and ill-health, had horrific consequences.

'King Cholera'

Of the many diseases rife in the insanitary conditions of the nineteenth century, cholera was by far the worst and most feared. Known at the time as 'Asiatic cholera' it began to spread in Europe from the second decade of the century, and reached Britain in 1831. Sunderland had the dubious honour of recording the first confirmed case, and William Sproat was the unfortunate victim. He developed shivering, stomach cramps, diarrhoea, and vomiting on Saturday 23 October 1831. Initially thinking he had 'summer diarrhoea' he did nothing. The next day he was seriously ill and a surgeon, Mr Holmes, was called who found him moribund. A second surgeon, Mr Kell (who had seen cholera abroad during military service) was called and confirmed the diagnosis. Sproat was treated with brandy and later opium, but died three days later. This was the start of the 1831-32 cholera epidemic, which was to kill an estimated 21,882. Further epidemics occurred in 1848-49, 1853-54, and 1866. The total mortality of these epidemics were respectively 55,201; 24,516; and 14,378.¹¹ All these figures are likely to be serious underestimates, as it is known the illness went

unrecognised in the early periods of the epidemics, and some towns made no official returns at all.

Cholera must, however, be put into context with other diseases rife at the time. The nineteenth century cholera epidemics caused nothing like the decimation of bubonic plague in earlier centuries. Also, tuberculosis ('consumption') was a constant and often fatal accompaniment of both urban and rural Victorian life, and smallpox (initially brought under control by vaccination) was becoming a growing problem as vaccination declined in popularity. However, the major infective problem in the nineteenth century was typhus, known variably as 'Irish fever', 'Goal fever' or (because it was common), simply 'fever'. This disease, spread by body lice, was both epidemic and endemic, and was an especial part of cellar dwelling. It is of interest that the control of typhus was actually the main concern of Chadwick's Sanitary Report. The enormity of the typhus problem was demonstrated in Glasgow (admittedly one of the most unhygienic of British cities - battling for the title perhaps with Liverpool and London), where in 1846 typhus accounted for the majority of all deaths, and in the 1830's was the cause of exactly half of all admissions to the Royal Infirmary.¹²

Why in view of this, did cholera attract such attention, and become an apparent instigator of sanitary reform? Why was the problem of typhus essentially ignored? To be fair, some reformers (such as Chadwick) certainly did not ignore the problem of typhus, but a legislative response was lacking. One important reason was the endemicity of typhus - it was constantly present, and people simply became used to it. Typhus was also very much 'a poor man's disease' occurring in conditions of filth, squalor, and insanitation. In the middle and upper classes it was rare, hence it was ignored by those with power and authority. Conversely, the afflicted poor tended to accept the disease in a spirit of deference as part of their lives. Their only champions were the occasional sanitary reformer such as Chadwick, as well as some inner-city doctors who directly witnessed the ravages of the disease. Cholera however was dramatic in its epidemic nature, lethal and contagious. *The Times* in 1832 commented that 'the cholera is the best of all sanitary reformers, it overlooks no mistake and pardons no oversight'.¹³ Flinn records

Edwin Chadwick - a passionate though sometimes difficult and politically inept man. His mission for sanitary reform led to the crucial 1848 Public Health Act.
By courtesy of The National Portrait Gallery, London.

that it 'struck terror into the minds of the upper and middle classes who ruled the cities and the country'. Cholera led 'as no other disease did... to immediate, vigorous, administrative action',¹⁴ and it is not therefore surprising that it became known at the time as 'King Cholera'.

The Failure to Respond

Unfortunately, this rapidity of response, though apparently welcome, may have been to some extent counter-productive. The cholera epidemics burnt themselves out almost as quickly as they started, and the impetus to continue change and reform declined as memories faded. Chadwick himself refers to this in his 1842 Sanitary Report - 'the alarm had passed' he comments, referring to the break up of most of the Local Boards of Health set up after the 1831-32 cholera outbreak. Chadwick was, however at least partially successful in his persistence - the Boards set up after the 1848-49 epidemic did last longer.

Chadwick's agenda was sanitary reform in general, and probably the control of typhus in particular. However, he was undoubtedly concerned greatly by the dramatic nature of the cholera epidemics; and in particular was spurred into action by the second great cholera epidemic which began in late 1848, very shortly after the successful passage of the Public Health Bill. He led the General Board of Health's report on the epidemic and vigorously campaigned to improve sanitation as rapidly as possible.¹⁵ His strong 'anti-contagionist' views on the transmission of cholera were against medical thinking during the 1848-49 outbreak. This was an interesting turn-around, as in 1842 Chadwick had castigated some of his commissioners for disregarding 'all the precautions advised by persons of complete knowledge' (ie doctors!).

Regardless of theoretical arguments, the Board had little time to react effectively. Fortunately, though the water-borne theory of cholera was not accepted, improved water supply was high on Chadwick's agenda. For example, in Mevagissey in Cornwall, those not yet infected were moved to a nearby tented camp with a separate water supply, and none developed cholera. In Dumfries, the epidemic was halted by changing the water supply to a site on a nearby river upstream (rather than downstream) from the sewage. Finer observes that, 'the Board with great show of energy did some of the right things for reasons mostly wrong'.¹⁶

It was the local authorities that failed the Board's good intentions; they had no legal powers to carry through directives, and Chadwick lacked the necessary skills of tact and persuasion. Some of the effects were devastating, for example the Board suggested the removal of children from a Pauper School in Tooting with fifteen to twenty cholera deaths daily, and this was simply refused. 'Repeatedly and earnestly', wrote Chadwick in his report on the 1849 epidemic, 'we urged the Boards of Guardians... the importance... of making immediate arrangements ... but our representations were in vain'. To be fair, the General Board (and Chadwick in particular) was seen as uncompromising and authoritarian. Their advice, though well intentioned, was not always practical - for example, the suggestion that poor people developing cholera burnt all their clothes. Also there was no 'money on the table'; for example Liverpool was advised to immediately appoint twelve new medical officers - a simple

financial impossibility. The relationship between health and economy was always difficult. Sanitation did not come cheaply, particularly when the reforms needed were the formation of new health care systems, efficient sewage disposal, and piped water supply. Finance was a major retarding influence on sanitary progress throughout this period, though it was perhaps one of Chadwick's major achievements that expenditure on health became regarded more and more as a necessity, rather than a political game.¹⁷

The cholera epidemic of 1849 naturally subsided, but the poor local response had been noted. *The Times* wrote with great rhetoric 'the parochial officers did nothing - absolutely nothing. They left the graveyards festering, cesspools seething, the barrels of blood steaming in the underground shambles, they rejected the medical officer's counsel'.¹⁸ Perversely, not only the cholera outbreak of 1848-49, but also its obvious lukewarm provincial response, focused public and political attention on the need for serious sanitary reform. This legislative response may have been slow and ponderous, but the medical profession too was unprepared and ineffective. The medical fraternity itself was highly split - physicians and surgeons belonged essentially to different professions with differing training and status. Surgeons were well below physicians in the pecking order, and farther down the list were the 'apothecaries' who acted largely in a servant-role to the other members of the profession. Whoever delivered medical care, it was all done privately and often at considerably inflated prices. It was also manifestly obvious that the most learned physicians had little or nothing to offer against the endemic infections of the time such as typhus or tuberculosis. All these factors, together with memories of body-snatching, led to something of a crisis of confidence. The press poked fun at the medical profession for its more absurd mistakes, such as one unfortunate Glasgow surgeon who diagnosed cholera when in fact his young female patient was in the early stages of childbirth! Frustration with the medical profession was a major reason for the 'Cholera Riots' which occurred in several cities in 1832. In June of this year, for example, eight separate riots occurred in Liverpool, mostly directed against doctors, and leading to several arrests. *The Liverpool Chronicle* recorded one mob outside a hospital crying 'bring out the burkers, there go the murderers'.¹⁹ The words 'burking' and 'burk' were recently introduced into the English language, referring to the Burke and Hare scandal of body snatching earlier in the century, and demonstrate the deep distrust with which the poor held the medical profession.

Medicine of course was very much empirical rather than scientific at this time. There was little encouragement or assistance for scientific research on medical illness, and even clinical observation was often ignored. The hallmark of the disease was profuse diarrhoea and dehydration, yet doctors persisted for a long-time in exacerbating this process by bleeding, purging or both. It is perhaps not surprising that for many lay-people, religion and prayer were their chosen modes of response to cholera. Indeed the concept of cholera being a punishment from God was for many as respectable a theory of causation, as were the contagious and miasmatic theories.

The 1848-49 Epidemic and Scientific Enquiry

The response to the 1848-49 cholera epidemic was to say the least limited. The epidemic struck literally within a few months (November 1848) of the passing of the Public Health Act and died away about twelve months later. The administrative procedure for the setting up of Local Boards was really too slow to alter the progress of the epidemic. However, at the onset of the epidemic the 'Nuisances Removal and Contagious Disease Prevention Act' was rapidly passed, putting the General Board in charge of any and all preventative measures. The Board's attempts at cleansing, disposal of bodies, and promotion of cleanliness were generally met with non-co-operation on a local level. The boundary problem meant that many local bodies had to be consulted; and in London, the Board's attempt to prevent saturation of the cemeteries was even met with a legal challenge which successfully prevented the Board from interfering. Advice from the Board for cholera victims to 'wash frequently' and 'burn their clothes' was hardly appropriate for the destitute. Irish immigrants, for whom a traditional 'wake' was an intrinsic part of the business of dying, also resisted the rapid disposal of bodies.

After the epidemic passed, the programme of Local Boards continued slowly, though even when established, divisions and other interests interfered with their work. For these and other inefficiencies, the

General Board frequently bore the brunt of criticism; compounded by its heavy bureaucracy and Chadwick's notorious tactlessness. Parliament also became increasingly irritated, and in 1854 Chadwick and other senior members of the Board were forced to resign - essentially 'pensioned off'. The General Board continued its work until 1858 and was then permanently disbanded.

The bitterly disputed debates on the mode of spread of cholera were until the 1848-49 epidemic simply theories, with none having any tangible basis. The latter outbreak however, led to what has become known as the 'Cholera - Fungus Controversy' of 1849.²⁰ In reality it should not have been a controversy, as it was essentially the discovery of the cholera bacteria. Members of Bristol Medico - Chirurgical Society, used microscopical technology, to see what we now know as *Vibrio cholera* in the 'rice water' stools of Bristol cholera victims in 1849. The differentiation between different types of micro-organisms was not known at the time - hence the name 'cholera-fungus'. The response to these observations was initially exciting but later critical. How did these cholera bodies cause the disease, and how did they spread? Also did

A cholera riot in Exeter, 1832, at the time of the first victim's burial. Rioting was related to fear, frustration, and sometimes distrust of the medical profession. By Thomas Shater.
by kind permission of The Royal Society of Medicine

they really exist at all? Early attempts to reproduce the findings of the Bristol doctors failed, though probably because the stool samples examined were taken too late in the illness. The 'cholera-fungus' debate failed to realise that the findings (if true) could begin the search for the true mode of spread of cholera. This however was left to an entirely different set of observations, by the London surgeon John Snow. Snow's now classical work concerned cholera occurrence in London and water supply. As early as in the 1832 epidemic, he had been struck by the likelihood that some sort of 'poison' caused the disease, which was passed in the stool of victims, and spread when sewage contaminated drinking water.²¹ It was his observations in the 1854 epidemic which provided strong evidence for his ideas - notably the famous 'Broad Street Pump' focus of cholera in South London. This observation concerned a ten-fold greater cholera mortality in residents supplied by the Vauxhall Water Company (drawing water from a very polluted part of the Thames) compared with those supplied by the Lambeth Water Company (who had moved their supply to a cleaner area of the river). As with the observations of the cholera

vibrio in Bristol, Snow's compelling finding received a disappointing reception, and in the same year the General Board of Health attacked his theories. However, even hardened 'miasmatisers' were now committed to a comprehensive programme of improved sanitation, which increasingly paid attention to the purity of water supply. Snow's observations seemed to diffuse into practice, and by the 1866 epidemic, London at least was more attentive to its water supply. Sadly, Snow was no longer alive to see his work gain widespread acceptance.

The Last of the Cholera – 1866

To a large extent, the last epidemic was the acid test of whether the medical advances of Brittan and Snow, and Chadwick's energies and legislation, had made a real impact. An interesting source describing the public health situation immediately prior to the epidemic is Stewart and Jenkin's pamphlet *The Medical and Legal Aspects of Sanitary Reform* published in 1866.²² Stewart and Jenkins were fully aware that a new cholera epidemic was coming (they referred to the 'threatened invasion of cholera'), and expressed concern about the country's preparation. They complained that the Sanitary Act of 1866 was 'permissive' – a word hauntingly reminiscent of Chadwick's earlier legislative concerns. The 1866 Act repeated the problems of 1848, permitting authorities to intervene if homes did not have proper sewage disposal systems, but once again not giving adequate powers of coercion. With justification, Stewart and Jenkins complained that 'to a sanitary reformer there is no greater bugbear than a permissive enactment'.

Despite these disappointments, mortality in the 1866 epidemic was lower than any of the preceding epidemics. Deaths per million were 685, compared with 1094 in 1854, and 3,034 in 1849.²³ Though sanitary improvement did play its part in the decline, there were probably other factors – improved social conditions and nutrition for example, and perhaps a generally declining virulence of the epidemics. This would be supported by the decline in mortality from 1849 to 1854, a period far too short for Chadwick's reforms to have had any major effect.

Conclusions

There is no doubt that cholera led to remarkable public and social reaction – indeed many historians regard the response as an over-reaction. Why did the people of Liverpool riot in response to cholera, when typhus and tuberculosis were constantly killing far more people? Why did the authorities in Manchester open a 'Cholera Orphan School', with no previous thoughts of similar institutions for the children of smallpox or typhus victims? Not surprisingly perhaps, a study of the 1848-1849 cholera epidemic in Reading has been entitled 'Much ado about nothing' – there were only 17 deaths, but the outbreak 'had profound implications for the relationships between local borough politics and public health reform'.²⁴

The above however is too simplistic a view. The public reaction (even to the point of rioting) was in reality entirely understandable. Cholera was fearful because of its violent epidemic nature, and the horrible mode of death it caused, with agonising abdominal cramps and profuse and foul diarrhoea. To England's poor, in the grips of one of the cholera epidemics, the bland figures of comparative mortality with

typhus were meaningless. Rich and poor alike could be struck down with cholera, and the ineptitude of both politicians and doctors was all too obvious. The sanitary responses were eventually fuelled by this public fear and frustration, at all levels of society.

In the end, cholera was the great leveller, and also the great exposé – of medical conservatism and incompetence, and political apathy and ineptitude. The lasting legacy of the disease was that it set in motion and accelerated the slow and difficult path to sanitary reform in Victorian England.

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